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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/786,401	02/25/2004	Thorsten Kammler	2000.110500	2890
23720	7590	07/11/2005		
WILLIAMS, MORGAN & AMERSON, P.C. 10333 RICHMOND, SUITE 1100 HOUSTON, TX 77042			EXAMINER SARKAR, ASOK K	
			ART UNIT	PAPER NUMBER
			2891	

DATE MAILED: 07/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/786,401	KAMMLER ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Asok K. Sarkar	2891	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 25 February 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,22,29 and 31-35 is/are rejected.
- 7) ☐ Claim(s) 2,4-21,23-28 and 30 is/are objected to.
- \* 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some    \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>6/15/2004</u> .   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Claim Objections***

1. Claim 10 is objected to because of the following informalities: In line 8, the limitation "selectively removing silicon dioxide" should be changed to "selectively removing silicon dioxide liner". Appropriate correction is required.
2. Claim 11 is objected to because of the following informalities: In line 11, the limitation "forming a silicon sidewall spacer" should be changed to "forming a silicon dioxide sidewall spacer". Appropriate correction is required.
3. Claim 22 is objected to because of the following informalities: In line 7, the limitation "forming the first recessed sidewall spacer comprising at least a layer of a first dielectric material in contact with said gate electrode, and a second sidewall spacer, second sidewall spacer being comprised of said first dielectric material" and then selectively removing a portion of the first dielectric material in line 13 is unclear since it does not specify whether it is removing the first spacer or the second spacer or both spacers. Appropriate correction is required.
4. Claim 24 is objected to because of the following informalities: It should depend on claim 22. Appropriate correction is required.

Claim 26 is objected to because of the following informalities: It should depend on claim 22. Appropriate correction is required.

Claim 30 is objected to because of the following informalities: It should depend on claim 22. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

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5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1, 3, 22 and 29 are rejected under 35 U.S.C. 102(e) as being anticipated by Chen, US 2004/0005750.

Regarding claim 1, Chen teaches a method, comprising:

- forming a recessed first sidewall spacer 50 adjacent to a sidewall of a polysilicon line 14 formed above a substrate 10, said first sidewall spacer exposing an upper sidewall portion of said polysilicon line 14 (see Fig. 6);
- forming a second sidewall spacer 52 adjacent to said first sidewall spacer, said second sidewall spacer having a predefined etch selectivity with respect to said polysilicon line and said substrate (since the spacer 52 is made of silicon nitride that inherently has a predefined etch selectivity with respect to polysilicon, see paragraph 44), (see Fig. 6);
- reducing a size of said second sidewall spacer 52 by a selective etch process according to said predefined etch selectivity so as to expose at least said upper sidewall portion (see Fig. 9); and

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- forming a metal silicide region 60 at least on said exposed upper sidewall portion (see Fig. 10) as described in paragraphs 26 – 51.

Regarding claims 3 and 29, Chen teaches sidewall spacer of silicon dioxide in Paragraphs 37 and 39.

Regarding claim 22, Chen teaches a method of forming a field effect transistor, the method comprising:

- forming a gate electrode 14 on a gate insulation layer 16 above a region 10, said region being comprised of a specified semiconductive material (see Fig. 6);
- forming a first recessed sidewall spacer 50, comprising at least a layer of a first dielectric material in contact with said gate electrode 14, and a second sidewall spacer 52, said second sidewall spacer being comprised of said first dielectric material, said first dielectric material having a specified etch selectivity with respect to said specified semiconductive material (see Fig. 6);
- forming a drain region 20 and a source region 18 (see Fig. 1);
- selectively removing a portion of said first dielectric material to substantially completely expose an upper sidewall portion of said gate electrode 14 (see Fig. 8); and
- forming a metal/semiconductor compound region 60 in said gate electrode, wherein said exposed upper sidewall portion promotes metal diffusion into said gate electrode as described earlier in rejecting claim 1 in paragraphs 26 – 51.

7. Claims 31 – 33 are rejected under 35 U.S.C. 102(b) as being anticipated by Ko, US 2003/0027414.

Regarding claim 31, Ko teaches a method, comprising:

- forming a first sidewall spacer 107 adjacent to a sidewall of a polysilicon line 105 formed above a substrate 101 (see Fig. 12);
- forming a second sidewall spacer 117 adjacent to said first sidewall spacer, said second sidewall spacer comprised of substantially the same material as said first sidewall spacer (see Fig. 12);
- reducing a height of said first and second sidewall spacers by a selective etch process so as to expose an upper sidewall portion of said polysilicon line (see Fig. 14); and
- forming a metal silicide region at least on said exposed upper sidewall portion (see Fig. 15) in descriptions of paragraphs 27 – 41.

Regarding claim 32, Ko teaches reducing a height of first and second sidewall spacers includes reducing a height of said first sidewall spacer during the formation thereof with reference to Fig. 14.

Regarding claim 33, Ko teaches reducing a height of said first and second sidewall spacers includes commonly reducing a height of said first and second sidewall spacers during the formation of said second sidewall spacer with reference to Fig. 14.

### ***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 34 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ko, US 2003/0027414.

Regarding these claims, Ko teaches wet etching of the spacers in paragraph 41. but fails to teach isotropic and anisotropic etch process.

However, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Ko and use both isotropic and anisotropic etch processes for etching for the benefit of shaping the dielectric layers to the desired spacer shapes.

***Allowable Subject Matter***

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12. Claims 2, 4 – 9, 23 – 28 and 30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

13. Claims 10 – 21 are objected to as being dependent upon an objected base claim, but would be allowable if rewritten in corrected form including all of the limitations of the base claim and any intervening claims.

### ***Conclusion***

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Asok K. Sarkar whose telephone number is 571 272 1970. The examiner can normally be reached on Monday - Friday (8 AM- 5 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William B. Baumeister can be reached on 571 272 1722. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

15. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.



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For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*Asok Kumar Sarkar*

Asok K. Sarkar

July 7, 2005

Primary Examiner